

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listing of claims in the above-referenced application.

Listing of Claims:

1. (Currently Amended) A method for forming a semiconductor device having a laminated structure including a dielectric film made from a metal oxide formed on a surface of a heated substrate and a CVD high melting point metal nitride film, wherein said metal nitride film is directly formed on said dielectric film by introducing a source gas containing said high melting point metal into a chamber in which said substrate is contained,

said method comprising a step of heating said substrate [[in]] while adding NH₃ gas, and, after said heating, adding to the NH₃ gas a non-reactive ambient having no component that reacts with said metal oxide formed on said surface of said substrate in said chamber, wherein said non-reactive ambient includes a member of the group consisting of a gas non-reactive with respect to said metal oxide contained in said dielectric film ~~and NH₃ gas~~, and

introducing into said chamber a source gas for forming said CVD-TiN film and NH₃ gas, following said heating step, and further

wherein a temperature of said substrate is set at a prescribed temperature, before said source gas containing said high melting point metal is introduced into said chamber.

2. (Currently Amended) The method for forming a semiconductor device according to claim 1, ~~wherein said non-reactive ambient treating step includes further comprising~~ a flow stabilizing step for a gas flow in said chamber.

3. (Currently Amended) The method for forming a semiconductor device according to claim 2, wherein said non-reactive gas portion ~~of said non-reactive ambient treating step~~ is introduced into said chamber during said flow stabilizing step.

4. (Currently Amended) The method for forming a semiconductor device according to claim 1, wherein said ~~non-reactive ambient treating step includes a step for heating said substrate is heated~~ to a predetermined temperature in said heating step, and said flow stabilizing step is performed after said heating step has completed and said predetermined temperature has stabilized for a predetermined length of time.

5. (Canceled)

6. (Currently Amended Previously Presented) The method for forming a semiconductor device according to claim [[5]] 4, wherein said NH₃ gas portion of said non-reactive ambient has a NH₃ partial pressure atmosphere of no greater than 1.0 Torr and no less than 0.1 Torr.

7. (Currently Amended) The method for forming a semiconductor device according to claim [[5]] 4, wherein said non-reactive gas and said NH₃ gas portions of said non-reactive ambient are introduced into said chamber during said flow stabilizing.

8. (Currently Amended) A method for forming a semiconductor device having a laminated structure of a dielectric made from a metal oxide and a CVD high melting point metal nitride film formed thereover, wherein said metal nitride film is directly formed on said dielectric film by introducing a source gas containing said high melting point metal into a chamber in which said dielectric film is contained, said method comprising;

heating a substrate onto which said dielectric film is formed to a prescribed temperature [[in]] and, during said heating, adding NH₃ gas, and, after said heating, adding to the NH₃ gas an ambient comprising NH₃ gas at a partial pressure no greater than 1.0 Torr and no less than 0.1 Torr before the introduction of said source gas containing said high melting point metal, wherein said NH₃ gas does not react with said dielectric film.

9. (Previously Presented) The method for manufacturing a semiconductor device according to claim 8, said method further comprising prior to the introduction of said source gas:

a step of heating said substrate to a prescribed temperature;
a step of maintaining said substrate temperature in a gas ambient that is non-reactive and neither oxidizing nor reducing with respect to said metal oxide and the flow thereof is stabilized; and
said NH₃ gas being introduced during at least one of said substrate heating step and said flow stabilizing step.

10. (Previously Presented) The method for manufacturing a semiconductor device according to claim 9, said method further comprising:

a step of introducing a source gas containing said high melting point metal, and growing a CVD high melting point metal nitride film after performing said flow stabilization step; and

a step of raising the partial pressure of the NH₃ gas during a second half of the CVD film growing step so that annealing of said nitride film by the NH₃ gas occurs.

11. (Previously Presented) The method for manufacturing a semiconductor device according to claim 1, said method further comprising:

a step, performed before said CVD high melting point metal nitride film forming step, of heating a substrate onto which said dielectric film made from a metal oxide is formed, in said chamber while introducing therein said non-reactive gas; and

a step of forming said high melting point metal nitride film on said dielectric film made from a metal oxide by introducing a gas mixture comprising said NH₃ gas and said non-reactive gas, said non-reactive gas in an amount equal to or larger than said NH₃ gas, and said source gas containing said high melting point metal in a volume amount that is less than said NH₃ gas.

12. (Canceled)

13. (Previously Presented) The method for forming a semiconductor device according to claim 1, wherein said dielectric film made from a metal oxide is a tantalum oxide (Ta₂O₅) film.

14. (Previously Presented) The method for forming a semiconductor device according to claim 1, wherein said substrate is heated to a temperature between approximately 400°C and 700°C before said source gas containing said high melting point metal is introduced into said chamber.

15. (Previously Presented) The method for forming a semiconductor device according to claim 1, wherein said non-reactive gas is selected from nitrogen, argon, hydrogen gas, or a mixture of these gases.

16. (Previously Presented) The method for forming a semiconductor device according to claim 1, wherein said high melting point metal nitride film includes a TiN film.

17. (Previously Presented) The method for forming a semiconductor device according to claim 16, wherein said source gas containing titanium as said high melting point metal, is a gas selected from the group consisting of titanium tetrachloride (TiCl₄), tetrakis dimethyl amino titanium (TDMAT), tetrakis diethyl amino titanium (TDEAT).

18. (Previously Presented) The method for forming a semiconductor device according to claim 1, wherein said high melting point metal nitride film includes a WN film, and wherein WF₆ gas is introduced as a source gas containing tungsten.

19. (Previously Presented) The method for manufacturing a semiconductor device according to claim 1, wherein said semiconductor device has a capacitive element, a dielectric film, and a CVD high melting point metal nitride film as a protective film disposed between said dielectric film and said capacitive element.

20. (Previously Presented) The method for manufacturing a semiconductor device according to claim 1, wherein said semiconductor device has a MOSFET with a gate insulation film of a dielectric film, and wherein said CVD high melting point metal nitride layer is the lowermost layer of the laminated gate electrode layer formed on said gate insulation film.

21. (Previously Presented) The method for manufacturing a semiconductor device according to claim 1, further comprising:

raising the partial pressure of the NH₃ gas during a second half of forming said CVD film on said metal oxide, so that annealing is done by the NH₃ gas.

22. (Previously Presented) The method for forming a semiconductor device according to claim 9, wherein said dielectric film is a tantalum oxide (Ta₂O₅) film.

23. (Previously Presented) The method for forming a semiconductor device according to claim 9, wherein said substrate is heated to said prescribed temperature between approximately 400°C and 700°C.

24. (Previously Presented) The method for forming a semiconductor device according to claim 9, wherein said non-reactive gas is selected from nitrogen, argon, hydrogen gas, or a mixture of these gases.

25. (Previously Presented) The method for forming a semiconductor device according to claim 10, wherein said high melting point metal nitride film comprises a TiN film.

26. (Previously Presented) The method for forming a semiconductor device according to claim 25, wherein a source gas containing titanium as said high melting point metal, is a gas selected from the group consisting of titanium tetrachloride ($TiCl_4$), tetrakis dimethyl amino titanium (TDMAT), tetrakis diethyl amino titanium (TDEAT).

27. (Previously Presented) The method for forming a semiconductor device according to claim 10, wherein said high melting point metal nitride film comprises a WN film, and wherein WF_6 gas is introduced as a source gas containing tungsten.

28. (Previously Presented) The method for manufacturing a semiconductor device according to claim 8, wherein said semiconductor device has a capacitive element, a dielectric film, and a CVD high melting point metal nitride film as a protective film disposed between said dielectric film and said capacitive element.

29. (Previously Presented) The method for manufacturing a semiconductor device according to claim 8, wherein said semiconductor device has a MOSFET with a gate insulation film of a dielectric film, and wherein said CVD high melting point metal nitride layer is the lowermost layer of the laminated gate electrode layer formed on said gate insulation film.

30. (Currently Amended) A method for forming a CVD-TiN film, wherein a titanium nitride (TiN) film is formed on a dielectric film that includes an oxide material formed by a CVD film forming process within a CVD film forming device, said method comprising:

heating a substrate provided with said dielectric film in said CVD film forming device while adding NH₃ gas, and, after heating, adding to the NH₃ gas, within an atmosphere having no component which reacts with said dielectric film including said oxide material; and

forming said titanium nitride (TiN) film on said dielectric film in said CVD film forming device.

31. (Previously presented) A method for forming a CVD-TiN film according to claim 30, wherein said dielectric film including said oxide material is a tantalum oxide (Ta₂O₅) film.

32. (Previously presented) A method for forming a CVD-TiN film according to claim 31, wherein said substrate is heated to a temperature of approximately 400°C to no greater than approximately 700°C.

33. (Previously presented) A method for forming a CVD-TiN film according to claim 31, wherein said atmosphere with said non-reactive gas with said tantalum oxide comprises gases other than said NH₃ gas.

34. (Previously presented) A method for forming a CVD-TiN film according to claim 31, wherein said atmosphere of non-reactive gas with said tantalum oxide comprises one gas selected from a rarified gas including nitrogen, argon, hydrogen gas, or a mixture of these gases.

35. (Previously presented) A method for forming a CVD-TiN film according to claim 30, wherein said non-reactive gas is a mixture of titanium tetrachloride (TiCl₄) and NH₃.

36. (Previously presented) A method for forming a CVD-TiN film according to claim 30, wherein said tantalum oxide film is formed as a capacitive film of a capacitor element and said CVD-TiN film is formed as a plate electrode.